CLAIMS

1. A method of determining a root mean square (RMS) of a signal for controlling operation of a converter, the method comprising:

squaring the signal;

sampling the squared signal n times during a cycle period to obtain n samples;

summing the first n-1 samples to obtain a first value;

multiplying the first value by a sampling time and a frequency of the signal to obtain a second value;

determining a compensation factor;

adding the compensation factor to the second value to obtain a third value; and

determining a square root of the third value to obtain a RMS result.

2. The method of claim 1 wherein determining a compensation factor comprises using an nth sample.

3. The method of claim 1 wherein determining a compensation factor comprises using the frequency of the signal.

4. The method of claim 1 wherein determining a square root of the third value comprises obtaining an approximate result by:

obtaining an approximate square;

deducting the approximate square from the third value to obtain a remainder;

dividing the remainder by an approximate square root to get a correction factor; and

adding half of the correction factor to the approximate square root to obtain a first RMS result.

5. The method of claim 4 wherein obtaining an approximate square comprises using a look-up table.

6. The method of claim 4 wherein obtaining an approximate square comprises performing a binary search.

7. The method of claim 4, further comprising:

squaring a fourth of the correction factor and dividing by the approximate square root to obtain an adjustment value; and

deducting two-times the adjustment value from the first RMS result to obtain a second RMS result.

8. The method of claim 1, further comprising:

monitoring the RMS result to detect an abnormal condition in a power grid.

9. The method of claim 8, further comprising:

disconnecting the converter from the power grid if the RMS result is indicative of an abnormal condition in the power grid.

10. The method of claim 1 wherein the converter is a DC-to-AC inverter.

11. A processor-readable medium storing instructions for causing a processor to determine a root mean square (RMS) of a signal by:

sampling the signal n times during a cycle period to obtain n samples;

squaring the first n-1 samples to obtain n-1 squared samples;

summing the n-1 squared samples to obtain a first value;

multiplying the first value by a sampling time and a frequency of the signal to obtain a second value;

determining a compensation factor;

adding the compensation factor to the second value to obtain a third value; and

determining a square root of the third value to obtain a RMS result.

12. The processor-readable medium of claim 11 wherein determining a compensation factor comprises using an nth sample.

13. The processor-readable medium of claim 11 wherein determining a compensation factor comprises using the frequency of the signal.

14. The processor-readable medium of claim 11 wherein determining a square root of the third value comprises obtaining an approximate result by:

obtaining an approximate square;

deducting the approximate square from the third value to obtain a remainder;

dividing the remainder by an approximate square root to get a correction factor; and

adding half of the correction factor to the approximate square root to obtain a first RMS result.

15. The processor-readable medium of claim 14 wherein obtaining an approximate square comprises using a look-up table.

16. The processor-readable medium of claim 14 wherein obtaining an approximate square comprises performing a binary search.

17. The processor-readable medium of claim 14, further comprising:

squaring a fourth of the correction factor and dividing by the approximate square root to obtain an adjustment value; and

deducting two-times the adjustment value from the first RMS result to obtain a second RMS result.

18. The processor-readable medium of claim 10, further comprising:

monitoring the RMS result to detect an abnormal condition in a power grid.

19. The processor-readable medium of claim 18, further comprising:

disconnecting a converter from the power grid if the RMS result is indicative of an abnormal condition in the power grid.

20. The processor-readable medium of claim 19 wherein the converter is a DC-to-AC inverter.

21. An electric power system to transform power between a power grid and a power source, the electric power system comprising:

a converter;

at least one switch selectively operable to electrically couple the converter to the power grid in a first state and to electrically uncouple the converter from the power grid in a second state; and

a controller coupled to control the converter and the at least one switch, the controller configured to determine a root mean square (RMS) of a signal associated with the power grid by:

squaring the signal;

sampling the squared signal n times during a cycle period to obtain n samples;

summing the first n-1 samples to obtain a first value;

multiplying the first value by a sampling time and a frequency of the signal to obtain a second value;

determining a compensation factor;

adding the compensation factor to the second value to obtain a third value; and

determining a square root of the third value to obtain a RMS result.

22. The electric power system of claim 21 wherein determining a compensation factor comprises using an nth sample.

23. The electric power system of claim 21 wherein determining a compensation factor comprises using the frequency of the signal.

24. The electric power system of claim 21 wherein determining a square root of the third value comprises obtaining an approximate result by:

obtaining an approximate square;

deducting the approximate square from the third value to obtain a remainder;

dividing the remainder by an approximate square root to get a correction factor; and

adding half of the correction factor to the approximate square root to obtain a first RMS result.

25. The electric power system of claim 24 wherein obtaining an approximate square comprises using a look-up table.

26. The electric power system of claim 24 wherein obtaining an approximate square comprises performing a binary search.

27. The electric power system of claim 24, further comprising:

squaring a fourth of the correction factor and dividing by the approximate square root to obtain an adjustment value; and

deducting two-times the adjustment value from the first RMS result to obtain a second RMS result.

28. The electric power system of claim 21, further comprising:

monitoring the RMS result to detect an abnormal condition in the power grid.

29. The electric power system of claim 28, further comprising:

disconnecting the converter from the power gird if the RMS result is indicative of an abnormal condition in the power grid.

30. The electric power system of claim 21 wherein the converter is a DC-to-AC inverter.